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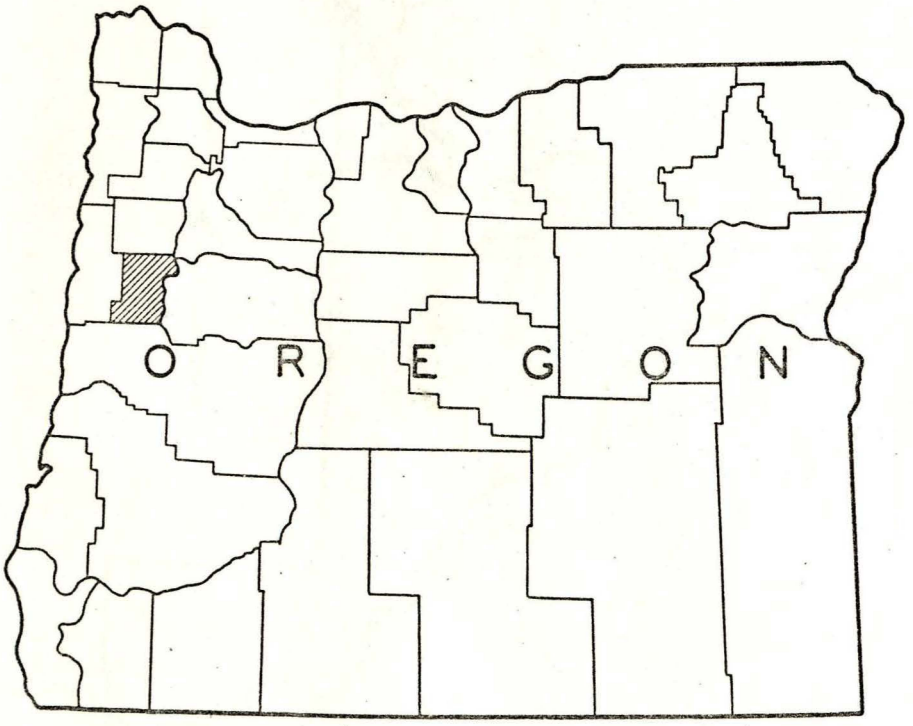
FOREST STATISTICS
FOR
BENTON COUNTY, OREGON

FROM THE FOREST SURVEY INVENTORY REVISED IN 1940

FOREST SURVEY REPORT NO. 85



U. S. DEPARTMENT OF AGRICULTURE FOREST SERVICE
PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
STEPHEN N. WYCKOFF, DIRECTOR

R.W. COWLIN, IN CHARGE OF FOREST SURVEY F.L. MORAVETS, ASSISTANT

PORTLAND, OREGON JULY 21, 1941

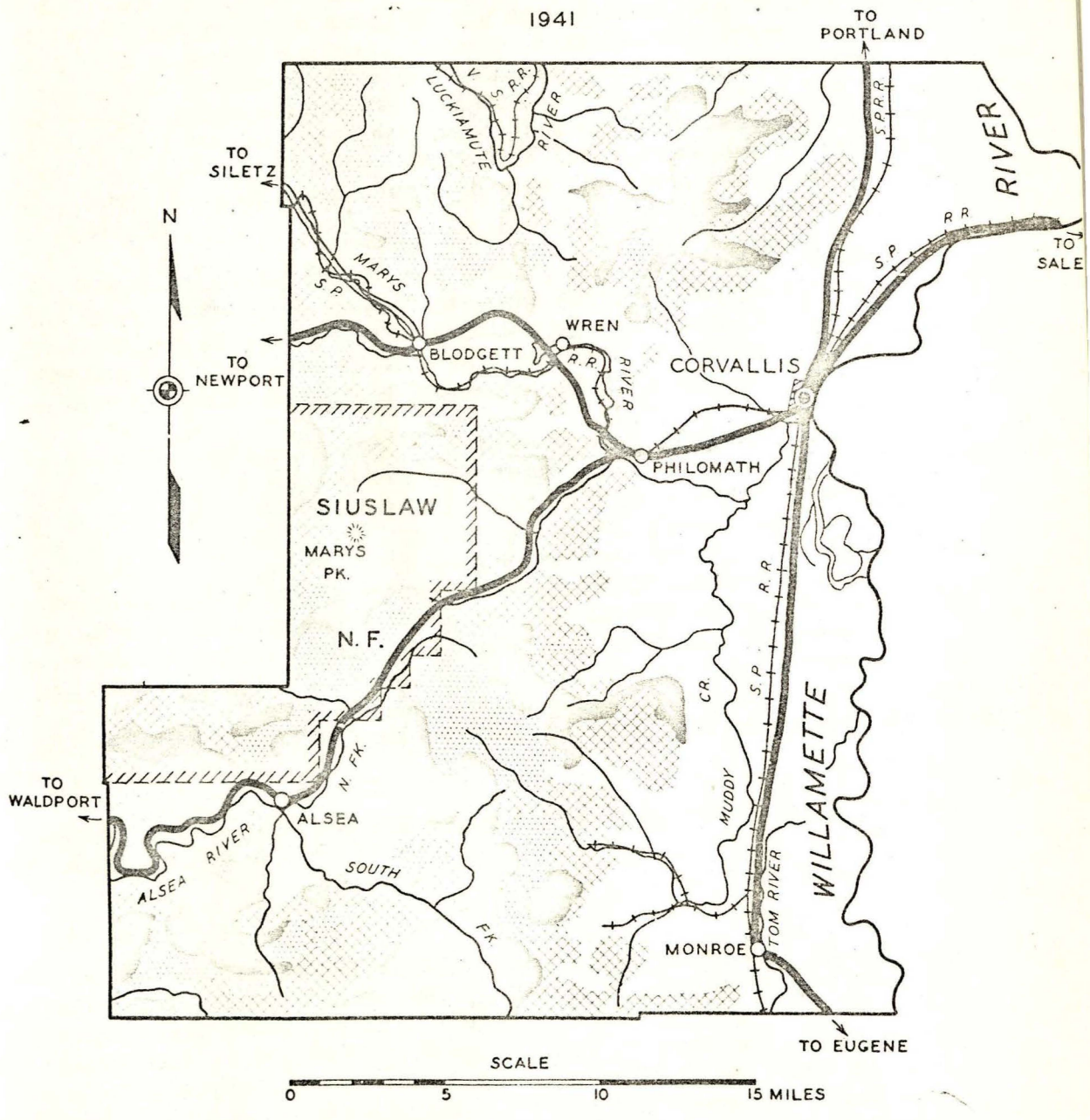
FIGURE I

OUTLINE MAP

OF

BENTON COUNTY, OREGON

1941



LEGEND

SAW TIMBER	DEFORESTED CUTOVERS AND BURNS
SECOND GROWTH	NONCOMMERCIAL FORESTS AND NONFOREST LAND

FOREWORD

The forest survey, a Nation-wide project, consists of a detailed investigation in five major parts of present and future forest resources: (1) An inventory of the country's existing forest resources in terms of areas occupied by forest-cover types and of timber volumes, by species, in board feet and cubic feet, and a study of conditions on cut-over and on burned forest lands; (2) a study of the depletion of the forests through cutting and through loss from fire, insects, disease, and other causes; (3) a determination of the current and potential growth on forest areas; (4) an investigation of present and prospective requirements of the United States for forest products; and (5) an analysis and correlation with other economic data of findings of these studies in order to make available basic facts and guiding principles necessary to plan for sound management and use of forest resources.

The forest survey of Oregon and Washington, an activity of the Pacific Northwest Forest and Range Experiment Station, was conducted in the Douglas-fir region during the period 1930-33, inclusive.* In 1937 work of keeping the survey up to date was commenced in counties in which there had been extensive depletion since the original survey.

An inventory of the forests of Benton County, Oregon, was first made in the fall of 1930. This inventory was later revised to adjust for cutting depletion that occurred in 1931 and 1932 and in 1934 a report summarizing statistics as of January 1, 1933, on timber volume, forest type area, and productive capacity of the county's forest land was issued. In the summer of 1940 the inventory was made current through field examination covering the entire county and recompilation of the statistical data. In the field revision of the inventory consisted of examination of all cut-over areas logged prior to 1930 and all burned areas to determine the condition of regeneration, checking of location and extent of recent cut-over areas logged since January 1, 1930, as shown by cut-over reports, and mapping of any areas cleared for agricultural use.

Results of this reinventory are given in this report which follows the one issued in 1934.

* Oregon and Washington were divided for survey purposes into two regions, (1) Douglas-fir region, consisting of that part of both States west of the Cascade Range summit, and (2) ponderosa pine region, that part of both States east of the Cascade Range summit. A regional report which includes an interpretation of the forest-survey data and analysis of the forest situation in the Douglas-fir region has been published and a similar report for the ponderosa pine region is now in the process of being published. Each region was divided into units--11 in the Douglas-fir region and 7 in the ponderosa pine region--for the purpose of more intensive analysis of data. It is planned to issue reports presenting findings for each unit.

FOREST STATISTICS FOR BENTON COUNTY, OREGON

Contents

	Page
Introduction	1
Physical character of the county	1
Agricultural zone	2
Forest zone	2
Conifer saw timber	3
Conifer second growth	6
Conifer seedlings and saplings	8
Recent cut-over areas	8
Nonrestocked cut-over and burned areas	8
Hardwoods	9
Noncommercial areas	9
Site quality	9
Merchantable timber volume	9
Ownership of forest resources	9
Forest industry	12
Forest growth	13
Comparison of inventories	13
Conclusions	15

Figures

1. Outline map of Benton County, Oregon — Inside cover

Tables

1. Area, in acres, of all forest cover types, by ownership class — 4
2. Area, in acres, of generalized forest types, by ownership class — 5
3. Area, in acres, of certain immature conifer forest types, by age class and degree of stocking — 7
4. Land areas, forest land areas, and commercial conifer area, by site quality class — 10
5. Volume of timber by species and ownership class — 11

FOREST STATISTICS FOR BENTON COUNTY, OREGON[1/]

By F. L. Moravets[2/]

Although the forests of Benton County, Oregon, have been utilized for nearly a century, the saw-timber stands were not extensive enough and of a character to attract large-scale operations. Fires, several of which occurred during the first half of the nineteenth century, so broke up the continuity of the county's virgin forest cover that early timber seekers found only scattered old-growth stands of limited extent intermingled with second-growth stands and deforested areas. As a consequence, the pattern of forest-land ownership is made up of small holdings--to a far greater degree than is found in most counties in the Douglas-fir region.

Under such conditions, the forest industry developed in the county has been comprised of small individual units and the progress of logging through the forest zone, while penetrating to practically all portions of the zone, has been spotted and intermittently timed. It is improbable that the remaining saw-timber stands, the majority of which are of second-growth timber, will invite an expanded industry. Rather, it is probable that several of the present-day sawmills will be abandoned in a few years.

The forestry situation need not become too hopeless, however, since more than one-half of the forest land is stocked with second-growth timber, from seedling to saw-timber size, and these stands, if properly managed, can sustain in the future a forest industry of considerable capacity.

In this analysis of the data obtained in the original and revised inventories, an attempt will be made to show the trend of timber supply, rate of depletion, and rate of replenishment through growth.

Physical Character of the County

Situated in west central Oregon, Benton County lies in the upper Willamette River Valley, extending westward from the river to a boundary a few miles beyond the summit of the Coast Range. North and south the

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1/ Assistance in the compilation of the data contained in this report was furnished by the personnel of Work Projects Administration official project 65-2-94-144.

2/ Field work of the revised inventory of the county's forest resources was done by D. L. Lynch, and compilation of the data by E. D. Buell, Edna L. Hunt, B. C. Baker, T. J. Rowe, and W. E. Zeuthen.

county is 30 miles in length; east and west it varies from 17 to 26 miles in width. Total land area was computed by the survey to be 417,115 acres.

In general, the topography of the county is not severe. The valley proper, bordering the Willamette River and from 6 to 8 miles in width, is only slightly undulating. Gentle slopes leading from the valley to the summit of the Coast Range are cut by relatively shallow stream courses. Westward of the summit, the slopes are more abrupt and stream courses more deeply cut.

Drainage is well defined. Practically all but the southwestern quarter of the county drains into the Willamette River through the Luckiamute, Marys, and Long Tom Rivers and Muddy Creek. The southwestern portion drains to the Pacific Ocean through the Alsea River and tributaries.

The county clearly divides into two land-use zones--the agricultural zone occupying the eastern two-fifths of the county, and the forest zone occupying the western three-fifths.

Agricultural Zone

The agricultural zone includes all of the valley portion of the county and extends for a short distance up the lower slopes of the foothills of the Coast Range. Forest cover within this zone is very limited, consisting of small scattered bodies of conifer second growth in the northern portion of the zone, stringers of northern black cottonwood, Oregon ash, red alder, and bigleaf maple along the streams, and small areas of Oregon white oak throughout most of the zone.

Development of the agricultural lands in the county, which began nearly a century ago, was fairly rapid since most of the valley portion was open prairie country and no arduous task of clearing was necessary to bring them under cultivation.

The present agricultural industry consists of general farming, orcharding, production of small fruits and vegetables, livestock and poultry raising, and a system of food-processing and marketing facilities. According to Bureau of the Census statistics for 1940 there was a total of 1,507 farms in the county in comparison to a total of 1,340 in 1930. Statistics for 1940 on the number of persons engaged in agriculture in the county are not yet available but those for 1930 show 39 percent of the gainfully employed directly occupied in agriculture. In view of the greater number of farms in 1940 it is probable that there has been an increase in the percentage of the gainfully employed engaged in agriculture.

Forest Zone

In addition to the early fires that broke up the virgin forests of the county, logging and land-clearing operations and subsequent fires

have made further inroads until the present cover pattern in the forest zone is characterized by the large number of type areas, small in extent and intermingled to an unusual degree. No large contiguous forest type areas remain.

Because of the ownership pattern and the isolated character of the saw-timber stands, logging operations have not been concentrated. Many of the burned-over and cut-over lands have restocked, resulting in stands of conifer second growth of varying age. On other of these deforested lands regeneration has failed because of repeated fires and bracken fern patches have resulted. The clearing of land within the forest zone for agricultural use has been confined principally to the valleys; however, the cleared areas comprise an appreciable acreage and are a part of the intermingled cover type pattern.

Although figure 1 shows in a general way the forest cover in the county, the patchwork pattern is best shown in the detailed forest type map of the county3/ which gives the segregation of cover by age class and degree of stocking and differentiates between areas deforested by fire and by logging.

As shown in table 1, which gives the area of forest cover types by ownership class, the survey classified 237,725 acres as forest land. This total represents 57 percent of the county's land area. Table 2 groups the forest cover types into seven generalized types. Each of these generalized types will be briefly discussed.

Conifer Saw Timber

Areas of saw timber shown in figure 1 in the northern portion of the county in the Luckiamute River drainage are almost entirely stocked with second-growth Douglas-fir timber from 20 to 40 inches in diameter breast height (type 8). Solid bodies of this class of timber in this part of the county are not extensive; the larger individual areas range from 2 to 5 thousand acres. Most of these stands are from 70 to 90 years of age. Further south in the Marys Peak district there is one relatively large body of saw timber of approximately 15 thousand acres comprised of both old- and second-growth Douglas-fir. Several bodies of saw timber, principally old growth, remain in the Alsea River drainage in the southwestern portion of the county. The largest of these lies on the South Fork.

Combined the saw-timber stands in the county cover a total of approximately 92 thousand acres or about 39 percent of the forest land

3/ One-inch-to-the-mile county type maps and $\frac{1}{4}$-inch-to-the-mile lithographed State type maps have been prepared to show the location and extent of the forest cover types. For information on them, address Director, Pacific Northwest Forest and Range Experiment Station, 423 U. S. Court House, Portland, Oregon.

Table 1.-Area, in acres, of all forest cover types, by ownership class
Data corrected to October 1, 1940

Survey type no.	Type	Private	State[1]	County	Municipal	Federal[1]			Total
						Revested land grant	Public domain	National forest	
	Woodland								
4	Oak	1,930	20						1,950
	Douglas-fir								
6	Large old growth	4,400	140	320	145	5,865	105	2,105	13,080
7	Small old growth	15,560	400	680	750	9,360	75	3,210	30,035
8	Large second growth	33,230	2,805	1,130	755	6,920	700	2,575	48,115
9	Small second growth	46,850	4,205	1,215	590	9,840	2,885	890	66,475
10	Seedlings and saplings	10,010	1,160	730	90	2,645	715	790	16,140
	Western hemlock								
14	Large					60			60
15	Small	25				65			90
29	Grand fir, large	115	40		50		5	60	270
	Hardwood								
31.5	Large	1,540	25	15		205	20	105	1,910
31	Small	3,955	425	100		215	40	20	4,755
	Nonrestocked cutover								
35	Cut prior to 1920	470	210					40	720
35A	Cut from 1920-29, incl.	10,975	325	660		1,740		165	13,865
36	Recent cut, since 1920	13,655	525	395		4,215	10		18,800
37	Deforested burn	10,345	2,320	900	40	6,120	1,535	200	21,460
	Total forest types	153,060	12,600	6,145	2,420	47,250	6,090	10,160	237,725
	Nonforest land								
3	Cultivated	175,215	975	150		155	10		176,505
2	Other	1,920	530	15	190	115	100	15	2,885
	Total	330,195	14,105	6,310	2,610	47,520	6,200	10,175	417,115

1/ Available for cutting.

Table 2.-Area, in acres, of generalized forest types, by ownership class
Data corrected to October 1, 1940

Type definition	Private	State[1]	County	Municipal	Federal[1]			Total
					Revested land grant	Public domain	National forest	
Conifer saw timber								
Types 6, 7, 8, 14, and 29	53,305	3,385	2,130	1,700	22,205	885	7,950	91,560
Conifer second growth								
Types 9 and 15								
On cut-over areas	17,320	535	565	210	455			19,085
On old burns	29,555	3,670	650	380	9,450	2,885	890	47,480
Total	46,875	4,205	1,215	590	9,905	2,885	890	66,565
Conifer seedlings and saplings								
Type 10								
On cut-over areas	7,215	1,005	420	55	1,080		755	10,530
On old burns	2,795	155	310	35	1,565	715	35	5,610
Total	10,010	1,160	730	90	2,645	715	790	16,140
Recent cut-over areas								
Type 36	13,655	525	395		4,215	10		18,800
Nonrestocked cut-over and burned areas								
Types 35, 35A, and 37	21,790	2,855	1,560	40	7,860	1,535	405	36,045
Hardwoods								
Types 31 and 31.5	5,495	450	115		420	60	125	6,665
Noncommercial areas								
Type 4	1,930	20						1,950
Total forest types	153,060	12,600	6,145	2,420	47,250	6,090	10,160	237,725
Nonforest land								
Types 2 and 3	177,135	1,505	165	190	270	110	15	179,390
Total	330,195	14,105	6,310	2,610	47,520	6,200	10,175	417,115

1/ Available for cutting.

in the county. On all but a very small acreage Douglas-fir is the predominant species, usually comprising at least 90 percent of the merchantable volume of the stand. Grand fir, western redcedar, and western hemlock occur in most of the Douglas-fir stands in varying small amounts as scattered individual trees.

Second-growth Douglas-fir saw timber (type 8) stocks a total of 48 thousand acres. Stands of this timber vary from 70 to 160 years of age and average about 25 thousand board feet per acre net volume. Some old-growth timber remains in these stands but usually contains considerable defect. The second-growth timber is generally sound, thrifty, and of very good quality.

A total of 30 thousand acres is stocked with old-growth Douglas-fir in which the majority of the volume is in trees from 20 to 40 inches d.b.h. (type 7). This type, known as small old growth, contains a considerable volume in large old trees and a small volume in thrifty second-growth trees. Net volume in these stands averages about 45 thousand board feet per acre. Most of the defect is in the larger older trees.

The area occupied by large old-growth Douglas-fir more than 40 inches d.b.h. (type 6) has been reduced to 13 thousand acres. The bulk of the cutting in the past has been of this class of timber and the remaining acreage is comprised of small scattered tracts. These stands range from 250 to 400 years of age and contain a relatively high percentage of cull timber. The large old trees are particularly defective and often quite rough and coarse in quality. Net volume per acre in these stands averages about 35 thousand board feet.

Conifer Second Growth

Conifer second-growth stands, in which the trees are from 6 to 20 inches d.b.h. (types 9 and 15), occupy a total of nearly 67 thousand acres or 28 percent of the county's forest land. Although these stands range from 20 to 90 years in age, there is an uneven distribution among the age classes. Approximately 33 thousand acres, or nearly one-half of the total acreage of this class of timber, is stocked with stands in the 40-year age class and nearly 89 percent is stocked with stands in the 30-, 40-, and 50-year age classes, table 3.

As in the saw-timber stands, these immature stands are composed almost exclusively of Douglas-fir; on all but 90 acres this species comprised 60 percent or more of the number of stems in the stand.

The degree of stocking of the Douglas-fir second-growth stands of this size class is relatively high. Table 3 shows 46 thousand acres, or about 70 percent of the total acreage in the type, medium stocked and the bulk of the remainder well stocked.

Table 3.-Area, in acres, of certain immature conifer forest types, by age class and degree of stocking
Data corrected to October 1, 1940

Age class (years)	Degree of stocking	Type number and name			
		10 Douglas-fir seedlings and saplings	9 Douglas-fir small second growth	15 Western hemlock small second growth	Total
10	Good	775			775
	Medium	4,370			4,370
	Poor	2,575			2,575
	Total	7,720			7,720
20	Good	30			30
	Medium	6,695			6,695
	Poor	1,695	25		1,720
	Total	8,420	25		8,445
30	Good		4,360		4,360
	Medium		9,750		9,750
	Poor		285	40	325
	Total		14,395	40	14,435
40	Good		6,670		6,670
	Medium		25,035		25,035
	Poor		1,170		1,170
	Total		32,875		32,875
50	Good		2,590		2,590
	Medium		7,885		7,885
	Poor		1,230	50	1,280
	Total		11,705	50	11,755
60	Good				
	Medium		1,190		1,190
	Poor		1,425		1,425
	Total		2,615		2,615
70	Good		430		430
	Medium		1,650		1,650
	Poor		1,290		1,290
	Total		3,370		3,370
80	Good				
	Medium		805		805
	Poor		300		300
	Total		1,105		1,105
90+	Good				
	Medium		120		120
	Poor		265		265
	Total		385		385
Total all ages	Good	805	14,050		14,855
	Medium	11,065	46,435		57,500
	Poor	4,270	5,990	90	10,350
	Total	16,140	66,475	90	82,705

Conifer Seedlings and Saplings

In relation to the area of cut-over and burned-over land in the county, there is a very small acreage stocked with seedling and sapling stands, in which the trees are less than 6 inches d.b.h. The total of 16 thousand acres stocked by these young stands is only about 7 percent of the county's total forest land area.

In general, regeneration of areas logged in the last 2 or 3 decades has not been satisfactory. Due to recurring fires and severe competition from brush, weeds, and fern, conifer seedlings have not become established on many of the areas. The burned-over areas, most of which were deforested several decades ago, support such a heavy stand of bracken fern that conifer reproduction is precluded.

Douglas-fir is the key tree in all of the seedling and sapling stands in the county.

The degree of stocking in the seedling and sapling stands is not as high as in the pole-size stands. Approximately the same percentage of the total acreage is medium stocked; however, only a very small percentage is well stocked.

Recent Cut-Over Areas

A total of nearly 19 thousand acres was clear cut in the county from January 1, 1930, to the time of the reinventory in 1940. These lands, classified by the survey as recent cut-over areas, were not examined to determine the degree of regeneration.

One fairly large tract of this type lies at the head of the North Fork of the Alsea River. The bulk of the remainder of the type's acreage is in the northern one-third of the county's forest zone, being comprised of scattered tracts from 80 to 1,000 acres in extent.

Nonrestocked Cut-Over and Burned Areas

All deforested areas logged prior to 1930 or burned over regardless of date of burning, not under cultivation or intensively grazed, were classified by the survey as nonrestocked cut-over and burned areas.

Of the total of 14,585 acres of cut-over land so classified, only 720 acres or less than 5 percent was logged prior to 1920, leaving a total of 13,865 acres of land cut during the decade 1920-29 that was nonrestocked. As data gathered in 1931 show that approximately 17 thousand acres was clear cut during this decade, it is apparent that less than 20 percent had become restocked by 1940.

The acreage of nonrestocked burned-over areas was approximately 1 thousand acres less in 1940 than in 1932.

Hardwoods

Practically all of the total of 6,665 acres typed as hardwoods is in the agricultural zone, most of it along the Willamette River and Muddy Creek.

The stands on only about 29 percent of the total hardwood acreage contained merchantable saw-timber volume.

Noncommercial Areas

Areas totaling about 2 thousand acres stocked with a scrubby growth of Oregon white oak were placed in this generalized type category. Stands of this species of merchantable character were classified as hardwood type.

Site Quality

In productive capacity, the forest soils of Benton County are considerably below the average for the Douglas-fir region of western Oregon and western Washington. As shown in table 4, a total of 229 thousand acres was classified as commercial conifer land and rated by the survey as to its forest-productive capacity. Of this area, only 2.4 percent was classed as site quality II and none as site quality I. In the Douglas-fir region as a whole approximately 30 percent of the acreage rated by the Douglas-fir classification was placed in these two most productive site quality classes. Ninety-four percent of Benton County's conifer land is of site III in contrast to about 43 percent of the region's land. However, only a small percentage of the county's land was placed in site IV and none in site V, the two least productive classes.

Merchantable Timber Volume

The reinventory showed a merchantable timber volume of 2,492 million board feet, log scale, Scribner rule, in the county. The preponderance of Douglas-fir is clearly shown in table 5, which gives the volume by species and ownership class. Total volume of this species was 2,341 million board feet, of which 1,448 million board feet, or 62 percent, was old-growth timber.

Less than 1 percent of the total volume was hardwood.

Ownership of Forest Resources

The ownership of forest resources in Benton County is somewhat unusual in the Douglas-fir region in that there are no large individual holdings, either private or public. Also the private and the various classes of public ownerships are intermingled to an unusual extent.

Of the 238 thousand acres of forest land in the county, 153 thousand acres, or 64 percent, is in private ownership and the remainder

Table 4.-Land areas, forest land areas, and commercial conifer areas, by site quality class[1]
Data corrected to October 1, 1940

Kind of forest land and site quality class	Total area		Area in forest land	Area in commercial conifers
	Acres	Percent	Percent	Percent
Commercial conifer				
Douglas-fir				
Class II	5,495	1.3	2.3	2.4
Class III	215,365	51.6	90.6	94.0
Class IV	8,250	2.0	3.5	3.6
Total commercial conifer	229,110	54.9	96.4	100.0
Woodland	1,950	.5	.8	
Hardwood	6,665	1.6	2.8	
Total other	8,615	2.1	3.6	
All forest land	237,725	57.0	100.0	
Nonforest land	179,390	43.0		
Grand total	417,115	100.0		

1/ The "site quality" of a forest area is its relative productive capacity, determined by climatic, soil, topographic, and other factors. The index of site quality is the average height of the dominant stand at the age of 100 years. Five site quality classes are recognized for Douglas-fir types, class I being the highest. In the survey Douglas-fir classifications were used not only for types in which this species is dominant but also for other types for which no site quality classifications have been developed.

Table 5.-Volume of timber by species and ownership class
Data corrected to October 1, 1940

Trees 16" and more d.b.h.[1]
Thousands of board feet, log scale, Scribner rule

Species	Private	State[2]	County	Municipal	Federal[2]			Total
					Revested land grant	Public domain	National forest	
Douglas-fir								
Large old growth	379,321	5,426	14,871	10,938	197,336	1,899	211,657	821,448
Small old growth	315,952	3,206	11,820	6,637	184,053	1,525	103,490	626,683
Large second growth	472,039	32,469	21,258	10,849	146,428	8,560	35,630	727,233
Small second growth	108,622	2,056	2,857	2,343	39,060	480	10,592	166,010
Western hemlock								
Large	9,931		1,020		8,222		13,087	32,260
Small	1,105		113		915		1,454	3,587
Western redcedar								
Live	13,829	13	607	182	15,824	2	5,784	36,241
Dead	159				185		46	390
Grand fir	51,262	1,050	20	2,861	732	282	4,168	60,375
Noble fir							126	126
Red alder	1,611	19	139	50	902	37	648	3,406
Bigleaf maple	6,025	106	272	280	3,078	30	1,296	11,087
Northern black cottonwood	1,388							1,388
Oregon white oak	1,070	5						1,075
Oregon ash	1,090	10						1,100
Total	1,363,404	44,360	52,977	34,140	596,735	12,815	387,978	2,492,409

1/ Trees of hardwood species taken from 12" and more d.b.h.
2/ Available for cutting.

is in some form of public ownership. Slightly smaller percentages of the remaining acreage of saw timber and merchantable timber volume--58 and 55 percent, respectively--are privately owned.

Of the publicly-owned forest land, the largest acreage is revested Oregon and California railroad grant lands under Federal administration. These lands total approximately 47 thousand acres and support a merchantable timber volume of 597 million board feet. Since they include the odd-numbered sections in a township they lie in an alternate pattern with both private holdings and those in other forms of public ownership.

State-owned lands total approximately 13 thousand acres. The largest concentration, approximately 5 thousand acres, is in the McDonald Forest and Peavy Arboretum which lie some 5 miles north of Corvallis and serve as a field laboratory for the school of forestry at Oregon State College. The remainder of the State-owned acreage is in small scattered tracts in several townships.

National forest lands, a part of the Siuslaw National Forest, total about 10 thousand acres. Nearly all of this acreage is concentrated in the vicinity of Marys Peak; a few small areas lie along the southern boundary of the county. The national forest lands in the Marys Peak region together with some $2\frac{1}{2}$ thousand acres of municipally-owned tracts constitute the City of Corvallis watershed.

The acreage of county-owned and federally-owned public domain lands, totaling about 6 thousand acres each, is comprised of small isolated areas.

Forest Industry

Although definitely not large scale as thought of in the Douglas-fir region, the forest industry of Benton County has been fairly stable. During the 15-year period 1925-39, when sawlog production averaged approximately 74 million board feet annually, peak of production reached in 1937 was 59 percent greater than the average and the low point in production, in 1933, was 41 percent under the average.

In 1940 the sawmill industry in the county consisted of 21 active and 2 idle mills. The active mills had a total combined 8-hour capacity of approximately 500 thousand board feet. Only one mill had a capacity greater than 100 thousand board feet and another slightly in excess of 50 thousand board feet. The remainder, chiefly of a semi-portable type and equipped to cut only second-growth logs of relatively small diameter, had capacities of less than 50 thousand board feet. Several of the mills are owned and operated by farmers during the slack seasons.

Like the mills which they supply most of the logging operations in the county are of small capacity.

Bureau of the Census statistics for 1930 show 20 percent of the gainfully employed in the county directly engaged in the forest industries.

Forest Growth

The rate at which the timber volume of the county is being replaced through growth was computed on the basis of data obtained in the original inventory.

At that time the area of growing stock, less than 160 years in age and putting on net increment, totaled 123,580 acres of which 121,190 acres was stocked by immature Douglas-fir types and the remainder by hardwoods.

The current annual net volume growth on trees 15.1 inches or more d.b.h. was computed to be a little over 19 million board feet and approximately 10 million cubic feet on trees 5.1 inches or more d.b.h. Ninety-five percent of the board-foot growth was being put on by the large second-growth (type 8) stands.

Potentially the forest lands of the county are capable of producing an annual net volume of growth several times greater than the current growth rate. It was computed that if all of the forest land in the county were stocked with growing stands and producing at 75 percent of capacity the annual net growth would amount to approximately 105 million board feet.

Comparison of Inventories

Although only about 8 years elapsed between inventories, some idea of the current trends in timber supply, rate of depletion, and rate of growth can be obtained from a comparison of the results of the two inventories. The following tabulation shows this comparison:

	1932 inventory	1940 inventory	Change
Forest land area	224 M acres	238 M acres	+6%
Saw-timber stands	108 M acres	92 M acres	-15%
Conifer second growth 6-20" d.b.h.	46 M acres	67 M acres	+45%
Conifer second growth 0-6" d.b.h.	23 M acres	16 M acres	-30%
Saw-timber volume	3,136 million bd. ft.	2,492 million bd. ft.	-21%
Douglas-fir volume all sizes	2,909 million bd. ft.	2,341 million bd. ft.	20%
Douglas-fir volume large old growth	1,125 million bd. ft.	821 million bd. ft.	-27%

The increase in forest land acreage was due to more intensive mapping of cut-over and burned-over areas utilized for grazing. A large acreage of the deforested lands is grazed at some time of the year to a varying degree and it was difficult, at the time of the original inventory, to draw the line between forest lands and those in agricultural use. In the reinventory, a considerable acreage of the stump land originally classed as agricultural was found to be not intensively managed for grazing and was therefore classified as forest land. In general, stump land and burned-over areas that were a part of a farm unit or that had been seeded to grass were classified as agricultural lands; all other areas of this character were classified as forest lands.

The decrease in the acreage of saw-timber stands as a whole was not great but the decrease in area of large old-growth Douglas-fir stands amounted to approximately 37 percent. Reduction in area of small old-growth (type 7) and large second-growth (type 8) Douglas-fir stands was approximately 13 and 8 percent, respectively. These percentages indicate that the overmature and more defective timber is being cut at a considerably greater rate than the thriftily growing timber. It is to be hoped that this trend will continue since many of the second-growth saw-timber stands in the county are near the age of maximum board-foot volume increment and their premature cutting would be an economic loss.

The substantial increase in area of conifer second growth 6-20" d.b.h. resulted from the passing of the stands mapped in the original inventory as seedlings and saplings into pole-sized stands. This relatively large acreage of pole-sized timber is one of the brighter spots in the county's forest situation. These together with the older second-growth stands of saw timber comprise a fair-sized backlog of future timber supplies.

The small acreage of seedling and sapling stands clearly points to one of the weak spots in the forest situation--the failure of a large part of the acreage logged since 1920 and most of the burned-over areas to restock. The lack of reproduction on many of these areas is due to recurring fires. All deforested areas in the county should be carefully classified according to the most productive use and areas classified as reforestation land should be given adequate fire protection. On a large number of the areas, particularly the old burns, advance growth of fern and brush prevents natural restocking by conifers.

The remaining volume of saw timber is considerably below the volume of normal growing stock that could be produced on the forest lands of the county. Assuming the 229 thousand acres of commercial conifer land, which averages site quality class III in productivity, were stocked to 75 percent of normality and managed on a 150-year rotation, the volume is calculated at approximately 4,000 million board feet. Thus, the present conifer volume of 2,474 million board feet is approximately 62 percent of this calculated figure.

Conclusions

Benton County's supply of saw timber, particularly of old growth, is becoming limited and remaining stands are both small in extent and quite widely scattered throughout the forest zone. In addition, individual holdings of saw timber are relatively small. These factors make it improbable that the forest industry in the county will be greatly expanded. The present industry consists of a large number of sawmills of small capacity supplied by equally small logging operations. Several of the mills are of a semi-portable type owned and operated by farmers.

The forest cover and ownership patterns in the forest zone of Benton County, both of which are intermingled to an unusual degree, suggest a future management plan involving relatively small sustained yield units made up of both private and public timber. Plans for putting the Federal, State, and municipal timberlands under sustained yield management are in the process of being drafted and these units will no doubt include much of the private timber. Some of the units will probably be operated in connection with farming and opportunity for farm-forestry projects will no doubt increase.

The hardwood stands, most of which are in the agricultural zone, particularly offer opportunities for the growing of forest crops on farm units.

Approximately 55 percent of the forest land is now stocked with immature stands and, if the large acreage of nonrestocked cut-over and burned-over lands could again be made productive, prospects of sustaining a forest industry approaching the present capacity would be fairly bright.